DOE Response to Radiological Releases from the Fukushima Dai-ichi Nuclear Power Plant

Nuclear Safety Workshop

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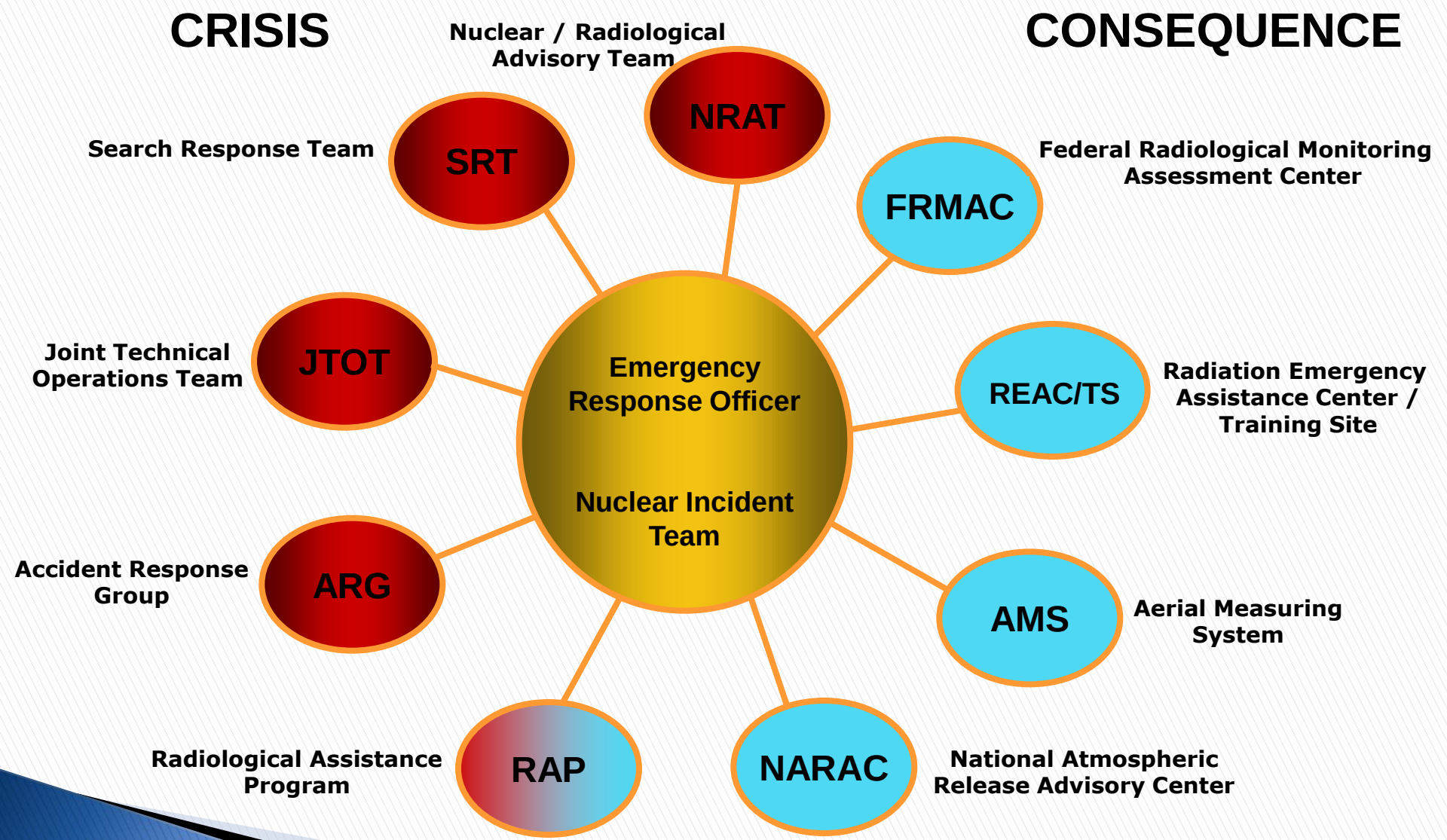
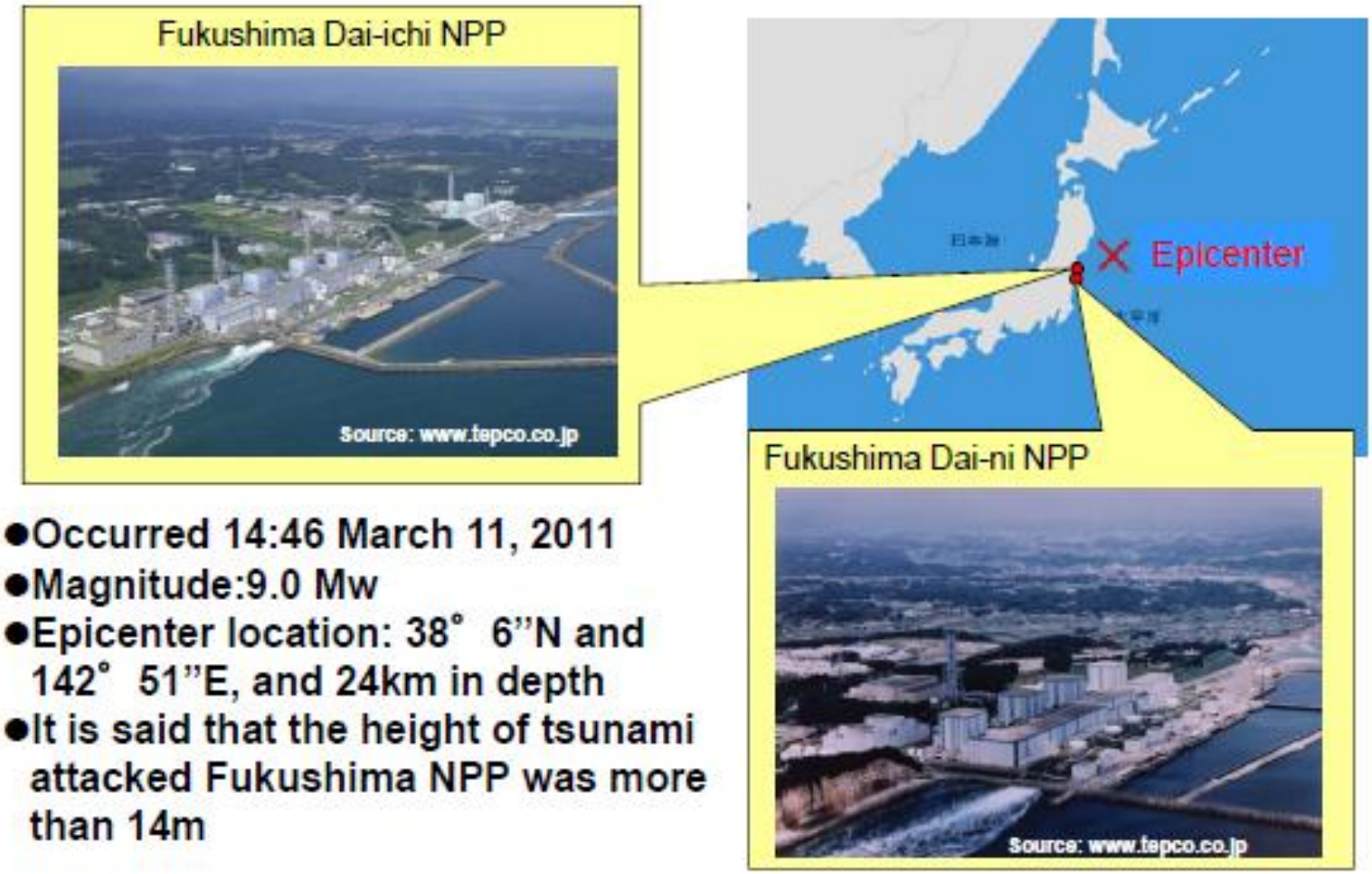
Associate Administrator for Emergency Operations
U.S. Department of Energy
National Nuclear Security Administration

U.S. DEPARTMENT OF ENERGY

Office of Emergency Operations



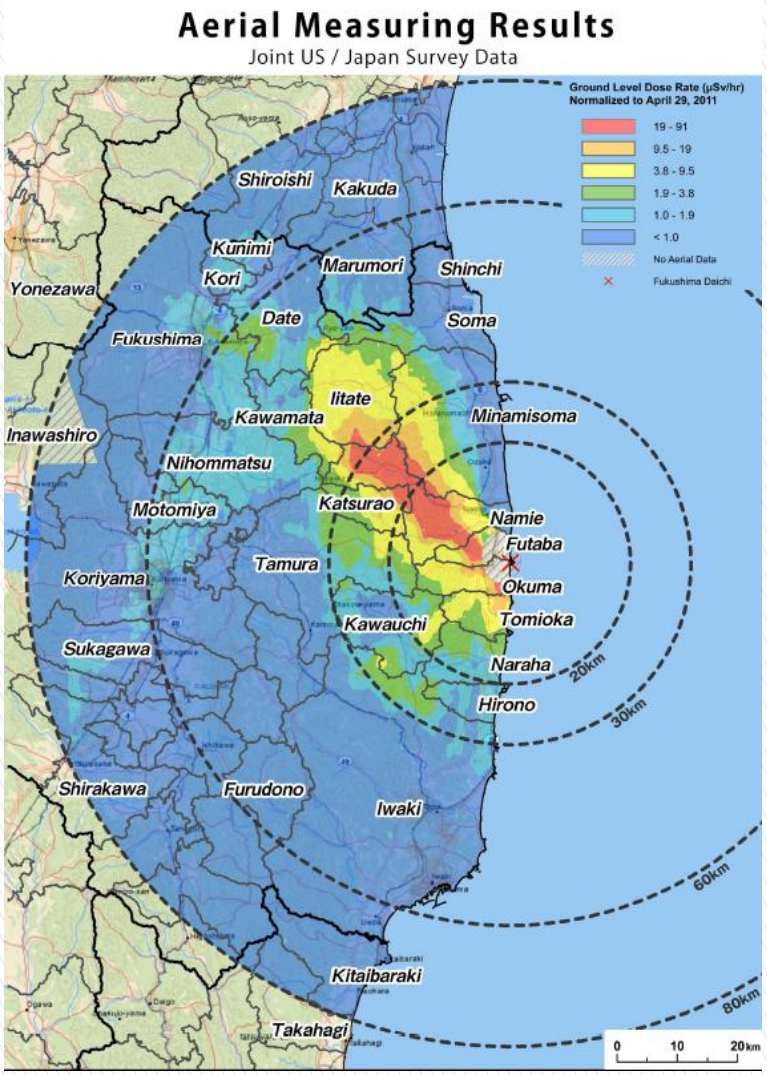
Statement of Problem



- Occurred 14:46 March 11, 2011
- Magnitude:9.0 Mw
- Epicenter location: 38° 6''N and 142° 51''E, and 24km in depth
- It is said that the height of tsunami attacked Fukushima NPP was more than 14m

Source: Nuclear and Industrial Safety Agency (NISA)

Fukushima Dai-ichi Damage & Deposition
(DOE AMS Perspective)



Partners

United States

- Department of State
  - American Embassy
- Department of Defense
  - US Forces Japan (USFJ)
- Department of Energy (DOE)
- National Nuclear Security Administration (NNSA)
  - All consequence management assets
  - And then some
- Nuclear Regulatory Commission
- Advisory Team for Environment , Food and Health

Japan

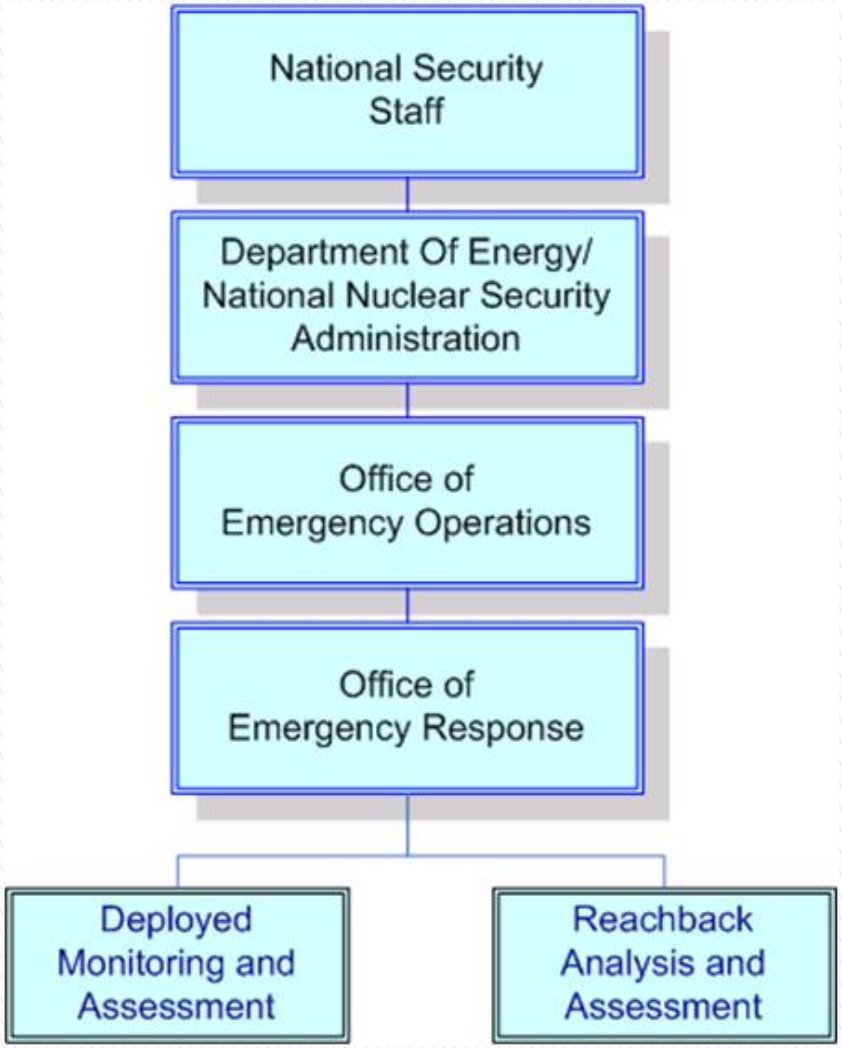
- Japan Atomic Energy Agency (JAEA)
- Nuclear Safety Commission
- Ministry of Defense (MOD)
- Ministry of Economy, Trade and Industry (METI)
  - Nuclear and Industrial Safety Agency (NISA)
- Ministry of Education, Culture, Sports, Science & Technology (MEXT)
  - Nuclear Safety Technology Center (NUSTEC)
- Ministry of Agriculture, Forestry and Fisheries (MAFF)
- Ministry of Health, Labour & Welfare (MLHW)

DOE/NNSA provided surge capacity

DOE Support to Operation Tomodachi

Mission:

Assess the consequences of releases from the Fukushima Dai-ichi Nuclear Power Plant (FDNPP)



DOE Timeline

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- March 11:
  - DOE/NNSA activated its assets
- March 14, 2011
  - At White House direction, DOE deployed a tailored CMRT and AMS capability via military airlift to Yokota Air Base

DOE Timeline (cont'd)

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- March 16: CM Assets arrive at Yokota AB and fly first AMS Test flight
- March 17: First aerial measurement activities over plant conducted; first field monitoring mission completed
- March 22: Initial data published on DOE website

DOE's home at Yokota AB

Distribution of Responsibilities

- Field
  - monitoring and sampling
  - preliminary data assessment
  - product development
- CMHT
  - detailed assessment
  - coordination of sample analysis
  - predictive modeling
  - response to requests for information/assistance
- NIT
  - initial command and control of deploying assets
  - coordination and communication for field assets and headquarters elements
- Embassy
  - assessment interpretation for Ambassador
  - coordination of bilateral monitoring and assessment activities

Field Team

Attributes

- **Experienced** : operate in a unique mission space.
- **Interdisciplinary:** address all aspects of mission.
- **Adaptable:** dynamic environment and non-standard measurement platforms.
- **Communicate risk** to partners and decision-makers.

Composition

- Small field footprint with large capability
- 33 personnel to Yokota AB
  - 12 scientists of many disciplines (nuclear, GIS, environmental, 5 PhDs, 2 CHPs)
  - Technicians with a diverse skill set
- 1 DOE HQ liaison to US embassy, Tokyo

Coordination & Advice

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- Partnership with USFJ for AMS
- Radiological consequence management advice for US ambassador and USFJ
- Planning, operations, and assessment with several ministries of the government of Japan
- Field expedient early warning system to be used while reactors were considered unstable

These activities aided key leaders in decision-making and informed DOE monitoring and assessment efforts

Aerial Monitoring

What was done

- Fixed wing and helicopter
- Up to 3 aircraft per day
- DOE & GOJ joint survey

Why it was done

- Map ground deposition out to 80 km from FDNPP
- Support evacuation, relocation, agricultural decisions

Ground monitoring

What was done

- Mobile mapping
- In-situ & exposure rate
- Air & soil sampling
- Contamination swipes
- DoD & GOJ data aggregation

Why it was done

- Calibrate aerial measurements
- Define isotopic mix
- Characterize the inhalation component of integrated dose
- Assess vertical and horizontal migration of deposited material

Assessment

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- Evaluation of field measurement results (aerial and ground)
  - Referenced to protective action measures
  - Informed mission planning
- Trend analysis and quality control
- Analysis of postulated scenarios to inform future planning

U.S. DEPARTMENT OF ENERGY

Activity to date

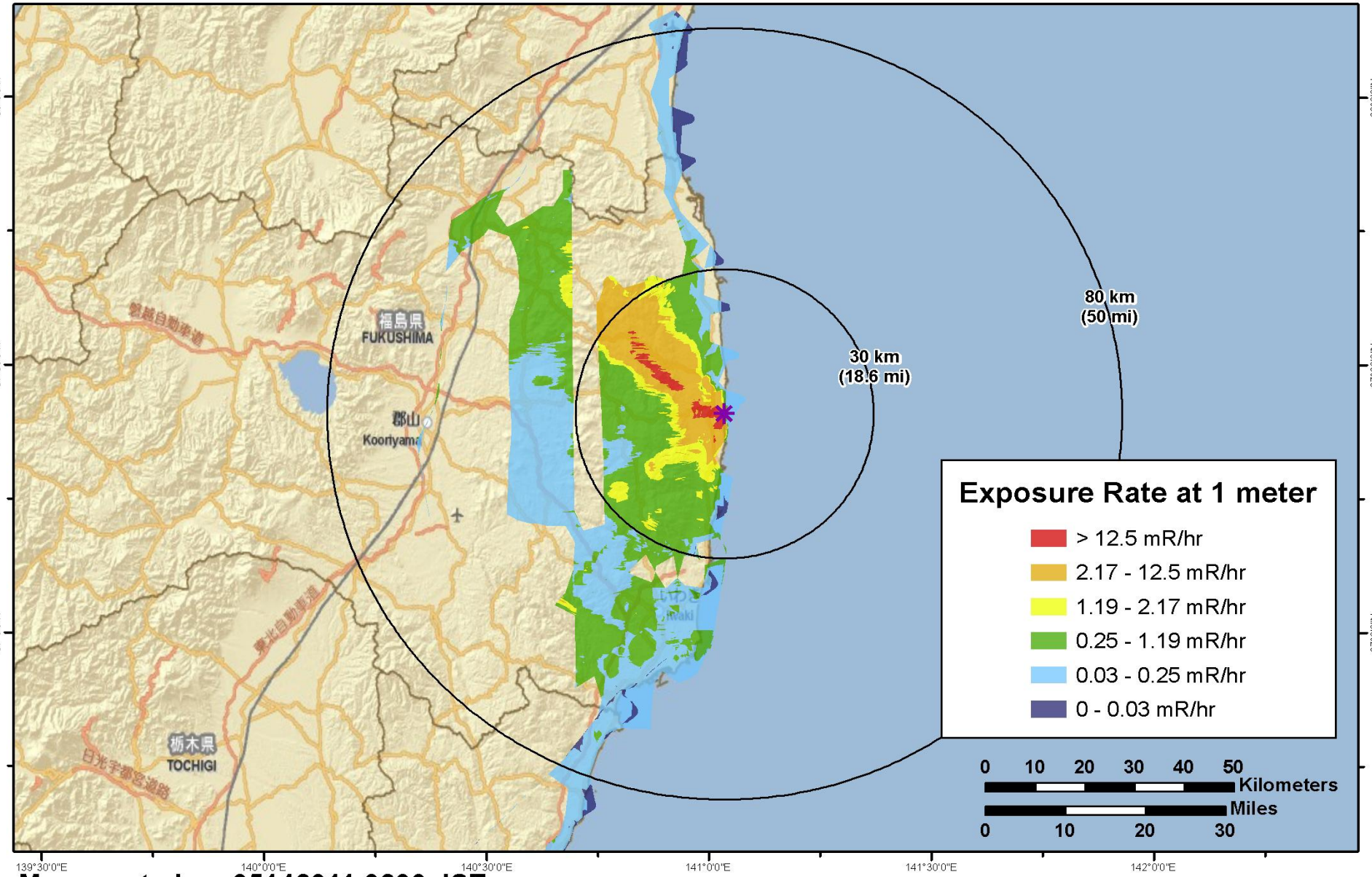
- Daily Aerial Measuring System missions over US installations and in the area around the FDNPS
  - > 85 flights
  - > 500 flight hours
- Daily monitoring activities at the U.S. Embassy, U.S. military installations, and in support of "ground truth" measurements for AMS
  - 620 air samples
  - 117 *in situ* spectra
  - 141 soil samples

National Nuclear Security Administration

Aerial Monitoring Survey Area

Overview of Aerial Monitoring Contoured Results (3/17-03/19 2011)

FUKUSHIMA DAIICHI
JAPAN



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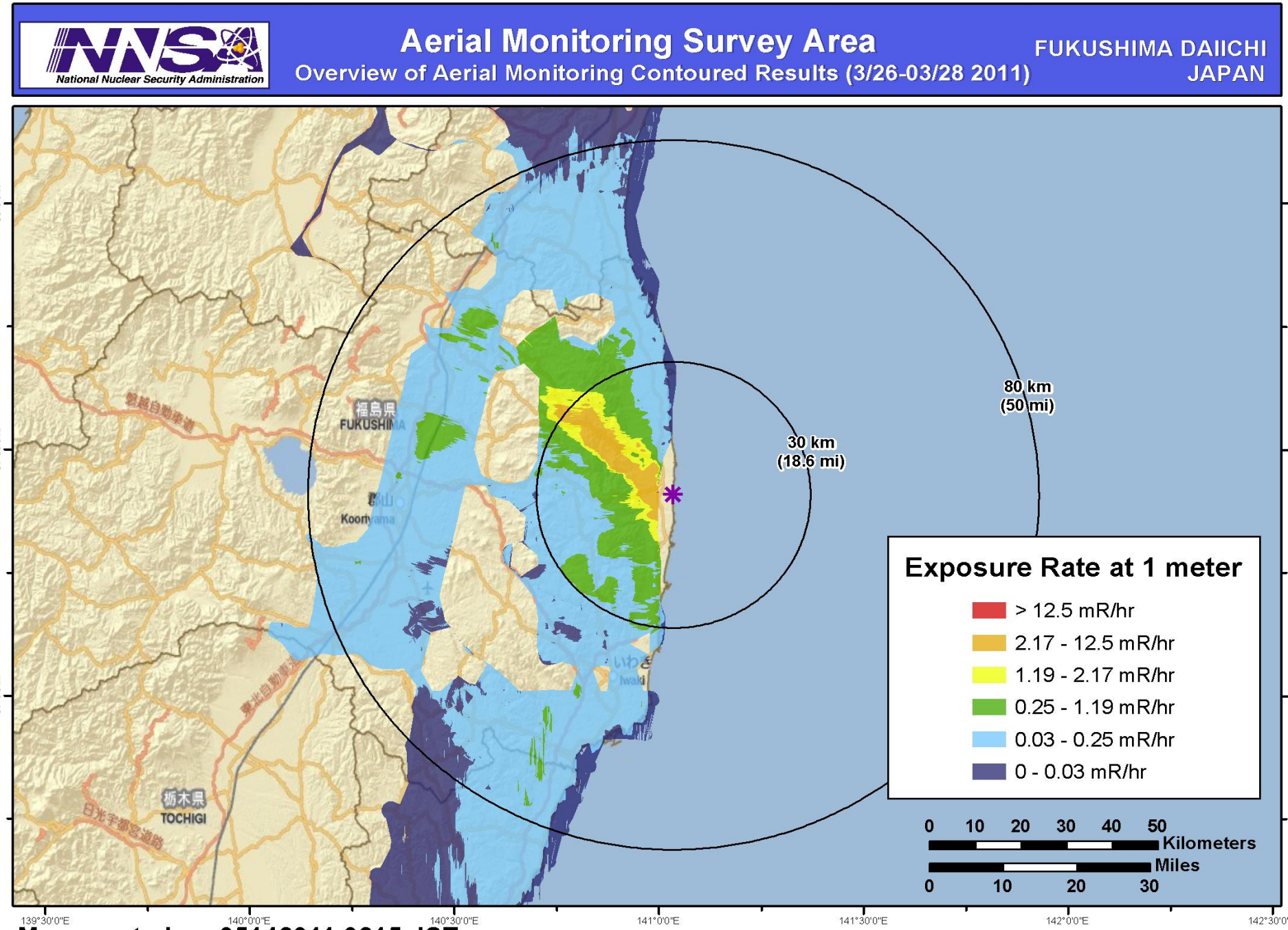
Contact (202) 586 - 8100



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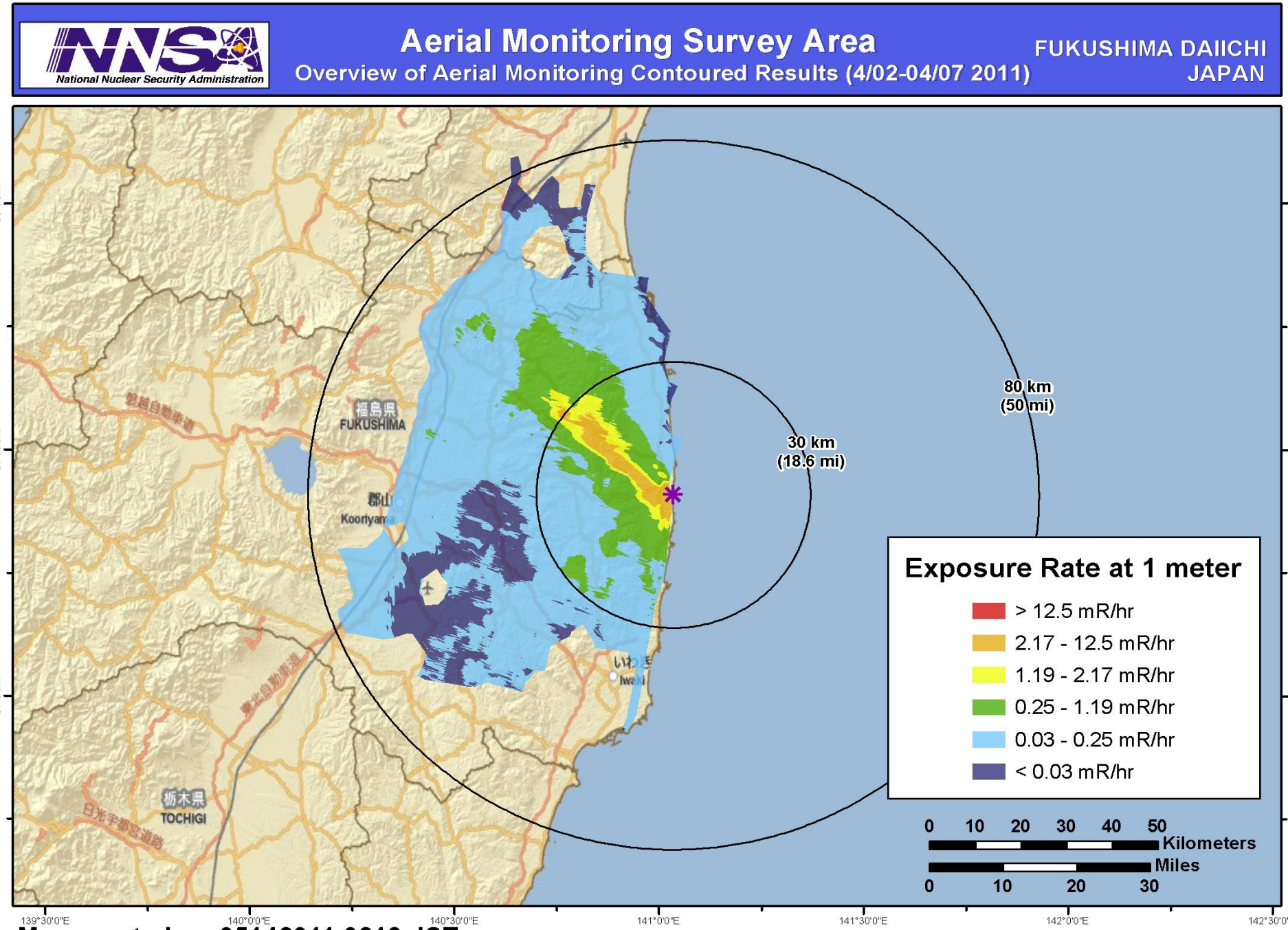

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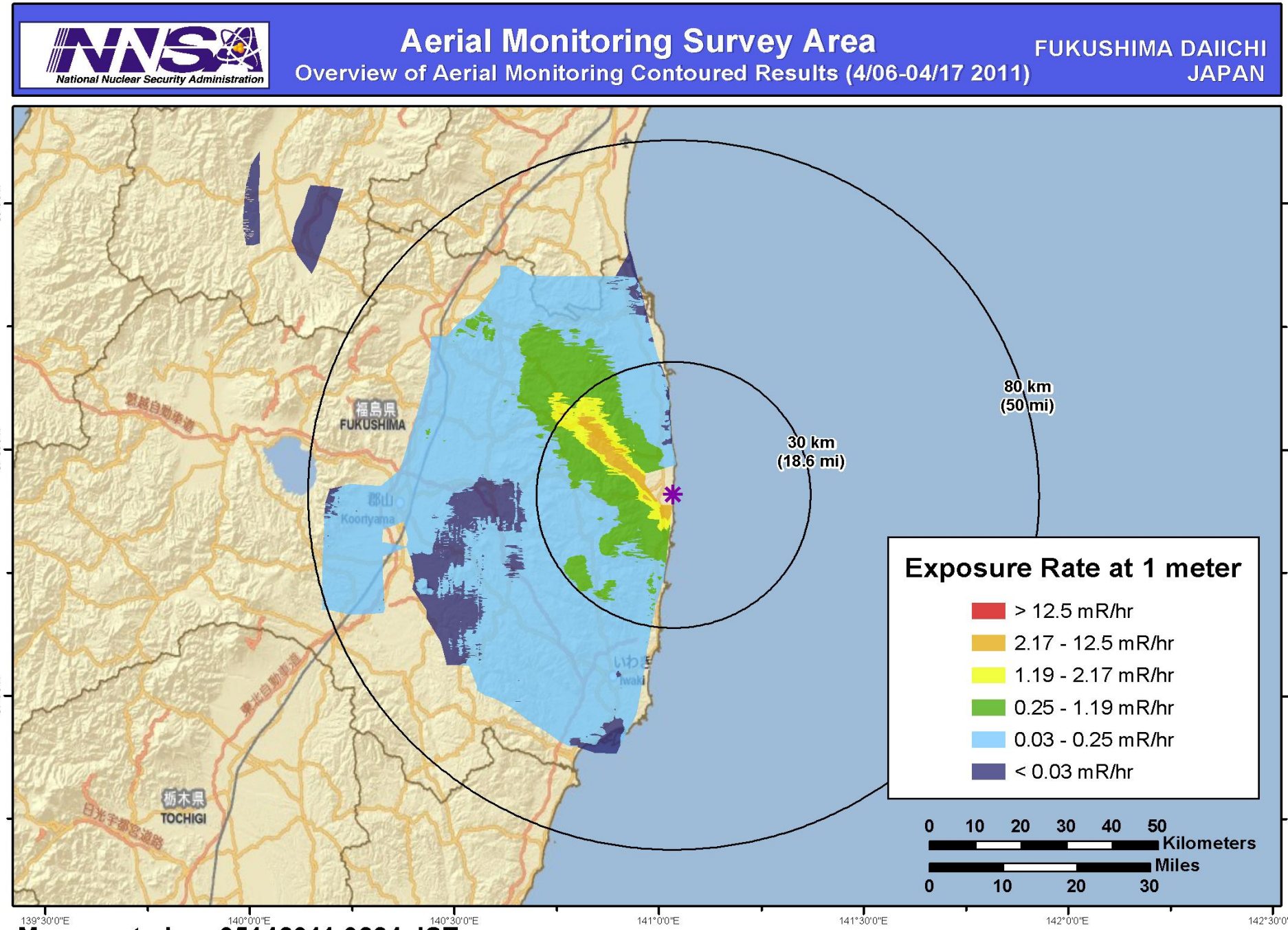

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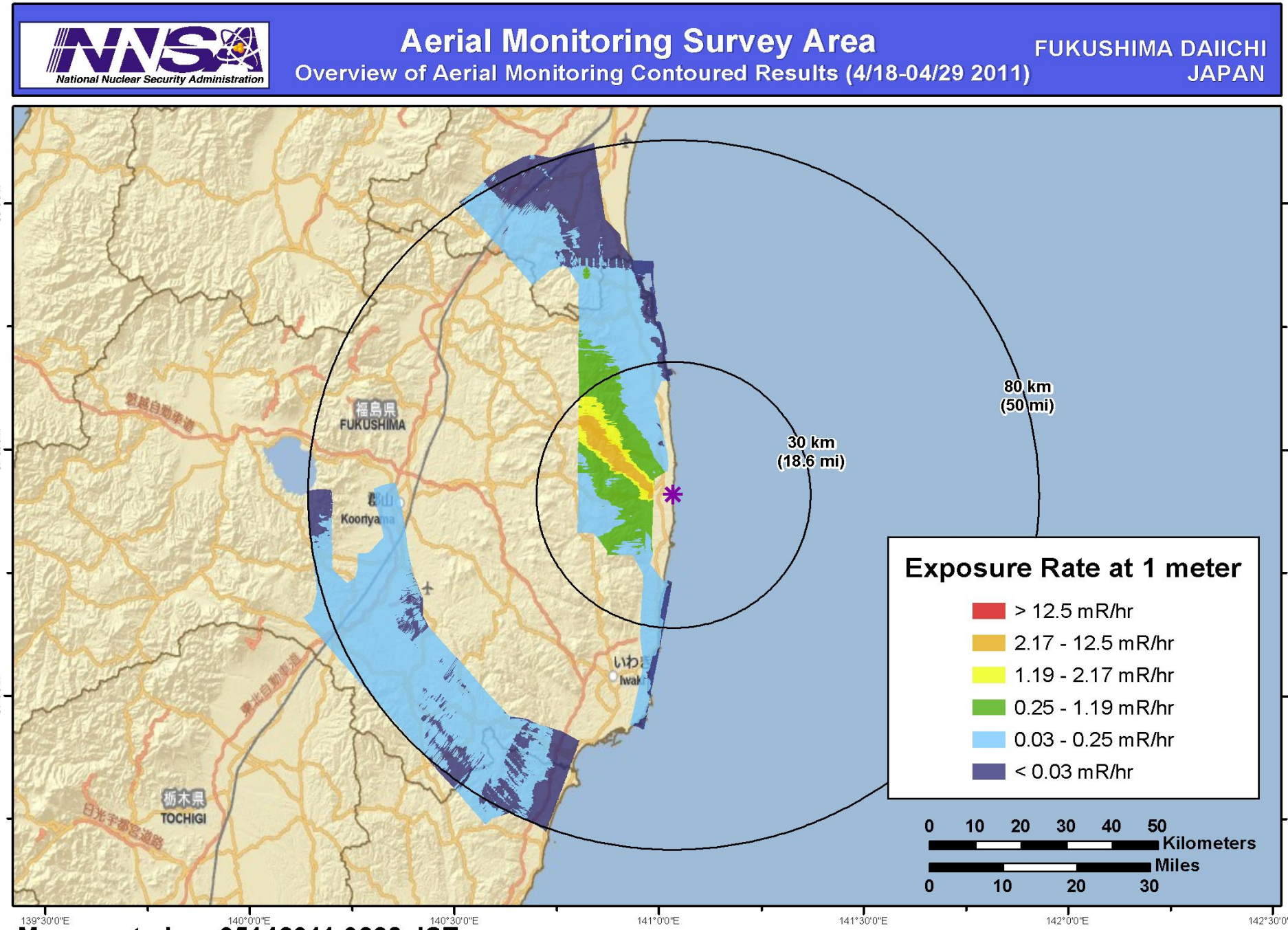

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Field Team Activity Successes

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- DOE was able to perform on-the-fly analysis to deal with multiple ongoing releases, unknown source terms, challenging terrain as well as non-technical pressures.
- DOE Scientists developed customized products for U.S. military (data products, InField Monitoring System).
- DOE scientists embedded with Japanese scientists to create joint data products.

End State

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- USFJ and Government of Japan to continue monitoring activities as needed
  - Japanese trained & equipped to fly DOE AMS
  - Japanese equipped with an enhanced laboratory analysis capability
  - USFJ trained & equipped to fly contingency AMS
  - DOE continues to support Japanese and USFJ from Home Team

Resilience following a nuclear catastrophe